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The variation of soil water storage and runoff threshold under the great disturbance of human beings

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To reveal the response of hydrological process to the greatly changing underlying surface and improve the hydrological prediction performance is a core task of the front direction in hydrological study. Recently, the underlying surface is changing significantly owing to a great disturbance from human beings. For example, the artificial planting has made the underlying surface more “green”, and the aeration zone tends to be thickening because of the overexploitation of groundwater in the north of China. The “greening” underlying surface and the thick aeration zone lead to the variation of soil moisture and storage, making the runoff threshold more unstable.

This study focuses on the variation of soil moisture and the runoff threshold under the disturbance from human beings. In this study, a variable runoff layer based hydrological model (VLHM) is constructed to capture the changing behaviors of runoff threshold. Results show that the threshold varies largely in the north region of China. The variation of runoff threshold is induced by different rainfall, vegetation and thickness of aeration zone. The runoff usually generate in a variable depth of the aeration zone, leading to different water storage and thereby different threshold. The threshold depends on the variable water storage due to different vegetation cover and depth of wetting front.